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ABSTRACT

In order to investigate the factors that affect the ability of children to decode and elaborate television information, a study was conducted in which verbal ability, spatial ability, and amount of home television viewing were examined, along with viewer attention and three levels of instruction, for their direct and interactive effects on comprehension of narrative, pictorial, and characterological television content. Aptitude-treatment interaction (ATI) effects were analyzed to determine if instruction can attenuate ability effects. Subjects for the study were fourth and fifth grade students from the regular educational programs in a school near Madison, Wisconsin. Students were randomly assigned to one of six classes--two each for the pictorial, characterization, and control instructional treatments. Aptitude tests were administered to students the week before the instructional treatments. Students' comprehension of a 1/2-hour videotape presentation was tested following completion of the instruction programs. Statistical analysis of the test results revealed that verbal ability accounted for more variance in comprehension than did spatial ability, while home viewing had no effect. No significant effects for instructional treatments were found, but ability-achievement relationships were stronger in the control groups than in the instructional groups. A reference list, six tables, and two figures are included. (Author/JL)

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Aptitude and ATI in Television Comprehension

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of the American Educational Research Association

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Aptitude and ATI in Television Comprehension

Marc Braverman

Various studies illustrate that children only partially comprehend the content of television presentations. For instance, Collins, Wellman, Keniston, and Westby (1978) showed that the ability to make inferences about program content is slow to develop in children. Collins (1975) cites consistent evidence to show that only gradually, from early grade school to early high school, is there improvement in the ability to comprehend plot structure and relationships among cues, and to infer causal sequences and characters' motivations.

The processing of material presented on television presents something of a paradox. On one hand, television viewing is widely seen to demand little cognitive effort and few or no cognitive skills. On the other hand, television's potential to transmit information is clearly very large, and assimilation of this information would seem to require some cognitive and elaborative capabilities. In point of fact, studies such as the ones referenced above and others do find that children's comprehension from the medium is often incomplete. How does this double view arise?

Salomon (1979) addresses the problem through analysis of television's symbol systems--the communicational elements through which a mediated presentation's content is encoded. Symbol systems are distinct from media themselves--a given symbol system is potentially utilizable by several media, and most media can make use of several symbol systems. However, a given medium will be equipped to utilize some symbol systems

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The research reported here was done as part of the author's dissertation at the University of Wisconsin-Madison.

better than others. Television's primary symbol system in the visual mode is pictorial, a quality it shares with film and photography. (In the audio mode it commonly uses spoken language and music as well.) By contrast, the print medium utilizes written text as its symbols. The two symbol systems--pictures and text--are distinguishable on some salient dimensions.

Print uses the alphabet and combinations thereof to code meaning. The relationship of written words to their referents, i.e., spoken words, is entirely arbitrary--in the absence of common cultural conventions, written words are meaningless. Consequently the acquisition of fluency in this system is a long and difficult process for children, entailing the learning of many unfamiliar associations. By contrast, the photographic pictures of television carry inherent rather than arbitrary meaning--they are perceived by the viewer as depicting real-life events. More technically, Salomon (1979) characterizes a picture's meaning as a similarity not between the symbol and its real-life referent, but rather between the symbol and the viewer's internal representation of that referent.

The formation of an internal representation is the point at which medium-related skills come into play. When confronted with any symbolically coded message, to draw meaning from it the viewer must recode it into an internal form and, to some extent, integrate it into his or her knowledge base. For children, as described, the recoding process required by print is difficult, while that required by television is potentially not of a difficult nature. By processing only the simplest levels of content, the reception of television information can become a relatively effortless and undemanding activity. However, many

children still lack the ability successfully to elaborate and integrate this information once it is received, and thus they fail to connect or notice elements of plot, motives, characterizations, and so on. In addition, some of the more difficult pictorial elements, such as unusual editing or camera movement, escape their comprehension as well.

Salomon and Cohen (1977) investigated some of television's requisite mental skills by comparing different versions of a videotaped story. These versions varied in the straightforwardness of their pictorial presentations and the cognitive demands made of the viewer. For instance, one version fragmented space by difficult camera points of view, another left small narrative gaps in the plot, etc. The skills involved included completing visual and verbal gaps, relating details to wholes, visual memory, and others. In predicting learning success, the researchers were able to demonstrate correspndence between the predominant coding elements and the presence of a particular, related skill. The more spatially demanding versions were more dependent on spatial skills; the more logically fragmented versions were more dependent on analytic skills. Thus, a proper match between the demands of the presentation and the skills of the viewer was found to be an important component of learning.

Another factor identified by Salomon (1979) as influencing children's learning from the medium is the demands of the task. Different tasks will produce varying amounts and forms of elaboration for material that has been encoded. This extra processing, beyond the point necessary to achieve simple meaning, serves to integrate the new material and improve later recall (Reder, 1980). Elaboration of decoded information is possible but not necessary, and in the case of television can take such

forms as attending carefully to the visual stimulus details, associating present stimuli with prior knowledge, analyzing the message form, anticipating future events, and so on. Thus, increasing the educational capacity of television depends partly on the capacity to stimulate elaborative processes in the viewer, through either content or situational characteristics.

The present study was designed with a view toward investigating the factors that affect the skills involved with decoding and elaborating television information. A half-hour commercially produced videotape was used as the stimulus. The learning of three kinds of content were examined through posttesting: narrative information, the use of pictorial and visual elements, and the use of characterizations.

Three kinds of potentially influential factors were examined: instruction, attention, and aptitude. More specifically, two areas of instruction--television's use of pictorial elements and its use of characterization--were compared with a control. Attention was varied in two conditions at the time of testing. The aptitudes examined were verbal and spatial ability, expressed in factor scores. In addition, reported amount of home viewing was included as a third aptitude because of a possible practice effect it might exert on televised learning.

A further area of interest was the possibility of aptitude-treatment interaction (ATI) effects. If verbal and spatial ability do indeed influence television learning, a relevant question would be whether instruction can attenuate the ability effect. For instance, if spatial ability is positively related to the acquisition of pictorial content, can instruction in the pictorial aspect of television compensate for a learner's initial low ability level, and thus weaken the relationship?

Therefore, ATI were examined for the relationships between verbal and spatial ability and the treatment variables--attentional directions and instruction.

Method

Subjects

The subjects in the study were 4th- and 5th-graders from an elementary school near Madison, Wisconsin. All children in the regular educational programs for the two grades were used. Three children did not complete the experiment due to moving or the retraction of parental consent. Students were randomly assigned to one of six classes--two each for the pictorial, characterizations, and control treatments--in equal proportions by sex but not by grade. Altogether there were 51 children in the pictorial condition, 50 in the characters condition, and 53 students in the control condition.

Six of the school's 4th- and 5th-grade teachers were used to teach the classes. They also participated in the development of the lesson plans. The teachers agreed to rotate among the classes, so that each instructional treatment was taught by each teacher for an equivalent period of time.

Instructional curriculum

For the children in the two experimental conditions. a five-day classroom unit was presented on one of television's communicative elements, either "pictorial elements" or "characterizations." These units were drawn from a program entitled "Centering Television," a commercially available classroom teaching package developed in Wisconsin

which aims to improve children's critical and perceptual skills relating to television viewing. The program's activities were revised and condensed to suit the conditions of the planned study. The detailed daily lesson plans were written collaboratively by the participating teachers, the curriculum developer, and the experimenter.

The "pictorial elements," or "pictures," treatment was constructed to cover lighting, composition, and camera point of view. It introduced the forms of lighting available to a TV production and illustrated their potential for creative and intentional communications. For composition, the unit dealt with foreground and background elements and how pictorial forms relate to each other. The point of view component directed attention to what the camera was doing in any scene--its position and movement.

The "characterizations," or "characters," unit dealt with the expression of personality components and their inference by the viewer. Through acting exercises and videotape viewing, children were taught carefully to observe gesture and movement. They also were encouraged to reflect on this information, speculating about characters' motives, emotions, and the possible consequences of their actions. Thus this unit encouraged elaborative processes while viewing.

The control group's instructional lesson plans related to television, reading, and communications, but did not deal with the communicative aspects of television per se. Activities included listening to old radio programs, surveying television's programming history, learning about kinds of occupations in the TV industry, and playing classroom games.

Materials

Aptitude measures. A series of verbal and spatial aptitude tests was administered to students in the week prior to instruction. The verbal measures were two subtests in the Verbal Battery of the Cognitive Abilities Test (Thorndike & Hagen, 1971): Vocabulary (Cronbach's α reliabilty = .72) and Sentence Completion (α = .70). Four spatial aptitude tests were administered: (a) Figure Synthesis from the Cognitive Abilities Test (a test of spatial visualization; Cronbach's α = .86), and (b) the following tests from the Kit of Factor-Referenced Cognitive Tests (Ekstrom, French, & Harman, 1976): Card Rotations (a test of spatial orientation, split-half r = .82), Building Memory (a test of visual memory, split-half r = .76), and Maze Tracing (a test of spatial scanning, split-half r = .88).

It was possible that children's ability to learn from a videotape presentation would be related to how much they watch TV at home. Therefore a seventh measure was given to obtain an estimate of the amount of students' home viewing. This was a checklist listing all the prime time TV shows on weeknights for the three networks and the one educational station. For each show, students indicated how many times a month they generally watched it, with responses ranging from 0 to 4.

Stimulus videotape. The videotape used as stimulus for the posttest was "The Ransom of Red Chief", produced by the Learning Corporation of America. It had been shown on commercial television 1-1/2 years before the experiment took place. The tape is in color and runs for one half-hour. Permission to use the tape was granted by LCA, and a 3/4-inch dub was provided for use by the tape's Midwest distributor.

Dependent measure. The experimenter developed a posttest made up of 35 multiple-choice items (Cronbach's α = .66). It contained three

subtests: general comprehension of the narrative (12 items), comprehension of the tape's pictorial elements (light, composition, and camera movement--11 items), and comprehension of characterizations (12 items). The first 12 items comprised the first subtest, hereafter called "narrative," and the remaining 23 items were a mix of the latter two subtests. Each of the items in the pictures and characters subtests referred to a short segment from the videotape lasting a minute or less. Each of these segments was associated with either one or two items. Beginning with item 13, subjects viewed a videotape segment and then were presented with the related item or items. To ensure precision and consistency between test sessions, the segments were placed on a 1/2-inch VHS videotape, in the order in which they appeared in the narrative. Eight-second intervals separated the segments on this tape.

When the test items were first developed they were validated by two adult judges, working in the field of educational technology. A sample item from the pictures subtest is the following:

"What can we see in this picture?"

a. The car is driving under a billboard.

b. The car is standing right under the tree.

c. The tree's leaves are close-up and the car is far away.

d. Both the car and the tree are moving away from the camera."

A sample item from the characters subtest is the following:

"What do the ladies think of Sam?

a. They want to know who he is.

b. They are a little frightened of him.

c. They know he is a kidnapper.

d. They don't want to be bothered by him."

Procedure

Aptitude testing. The study took three weeks in all. During the first week, the experimenter and another male researcher administered the aptitude tests in the students' regular classrooms. The total testing time per class was about 1 hour 45 minutes, spread over two days. Each class was tested on consecutive days, either Monday-Tuesday or Wednesday-Thursday. The order of test administration was randomly assigned for each class. Each class had a different researcher on the two days of testing. The order of the two researchers for Days 1 and 2 was counterbalanced across classes.

Instructional Implementation. The second week of the study was the instructional week. The six mixed-grade classes produced from the randomization procedures were each assigned to an instructional treatment--pictures, characters, or control--with two classes per treatment. The six hours of instruction took place over five days, taking two hours on Monday and one hour each on Tuesday through Friday. The detailed lesson plans for all five days provided that activities within the classes were implemented as planned. Observation of the classes by the experimenter confirmed that the lesson plans were followed.

To control for teacher differences, a teacher-class schedule was produced and implemented that provided for each teacher to teach each of the three treatments for an equal amount of time, i.e., two hours per treatment. Each teacher taught one class in one of the treatments on Monday, one class in a second treatment on Tuesday and Wednesday and one class in the remaining treatment on Thursday and Friday. For each teacher, the order of treatments and the assignment to either of the two classes in each treatment was randomly made.

Posttesting. The dependent measure was administered on Wednesday and Thursday of the week following instruction. The children were tested in 12 randomly assigned viewing groups of 13 each, with equal representation of boys and girls across groups. Absences and make-ups produced slight variations in group size. Children who were absent for scheduled test days were all tested in a make-up session the following Monday.

The sessions were given by the same researchers who did the aptitude testing. They were assigned randomly to six sessions each. Each researcher's six sessions were split into three in the viewing directions condition (D) and three in the no-directions condition (ND), the actual order of these being randomly determined for each tester. There were 77 children in each of the two viewing conditions, D and ND. The former condition increased session time by about 20 minutes.

The sessions began with the researcher giving a short introduction. In the ND condition he gave the tape title and running time, said that he would ask a few questions when it was over, and told the children to pay attention. In the D condition he opened in the same way and then led a short discussion regarding light, camera movement, and characterizations; this followed in content the themes of the related instructional treatments. Then he asked the children to watch for these things, and played the tape on a 25-inch color monitor.

When the tape was through the researcher gave the posttest. Using an overhead he projected the test items onto a blank wall and read each item aloud as the children read along. This was done to ensure full comprehension of the items and to guard against a possible spuriously high effect for reading ability. After the first 12 items (the narrative subtest), the researcher explained that the children would be viewing

short clips from the show and in the D condition went through the original discussion a second time. Children viewed the clips, then answered the questions. The use of the overhead instead of a question booklet ensured that subjects could not read the item before seeing the clip. After the test the researcher thanked them and sent them back to their classrooms.

Results

Descriptive statistics on aptitudes

Table 1 presents descriptive stastistics for the aptitude and outcome measures within each of the three instructional treatments. The means and standard deviations for the seven aptitude variables were similar across the treatment combinations. Table 2 presents the correlations among the aptitude variables.

The TV-viewing questionnaire apparently presented difficulties for some children. Several estimates of overall watching time were high, generally resulting from the reporting of more than one show watched during a given time interval. Therefore this variable should be treated with caution. However, it can be meaningful if we interpret it not as actual hours of watching, but as reported hours of watching. As such it has a good deal of precedence in the television literature (e.g., Comstock et al, 1978).

Factor analysis of aptitude data

It was expected that the scores on the ability tests would be largely explainable by two underlying factors, verbal and spatial ability. These six tests--all but the television questionnaire--were placed into an SPSS

PA2 factor analysis to see whether this was indeed the case. Two factors were retained which corresponded clearly to verbal and spatial components (Table 3). Prior to rotation Factor 1 accounted for 50.5% percent of the total variance in aptitudes and Factor 2 accounted for 16.7%. An oblique rotation was used which resulted in a correlation of .53 between factors. Factor 1 was considered verbal ability and factor 2 spatial ability. Reported viewing correlated -.37 with verbal ability and -.31 with spatial ability. The two factors, plus reported viewing, were used as aptitudes in the regression analysis.

Description of the regression analysis

Regression analysis was used to determine the effects on the outcome measures of the experimental treatments, the aptitudes, and the aptitude-treatment interactions. There are several regression methods that can be used for this kind of analysis; the one used here was a simultaneous step-up procedure, in which predictor variables were entered into the equation in sets. Within each set of variables entered together, the procedure produces partial regression coefficients that are orthogonal to the other variables in that set. The next set of variables is applied to the residual variance.

Regression equations were obtained for four dependent variables: narrative, pictures, characters, and total score. In each case the predictor variables were entered in three stages: (1) experimental treatments and treatment interactions; (2) aptitudes; and (3) aptitude-treatment interactions.

The six experimental treatments--resulting from the crossing of three instructional conditions and two attention conditions--allowed for five contrasts representing the degrees of freedom. Five contrast variables

were created, and were used for each dependent variable's regression analysis. These are presented in Table 4. In conceptual terms they represent the following: (1) viewing directions vs. no viewing directions; (2) pictures instruction vs. control group; (3) characters instruction vs. control group; (4) interaction of pictures instruction with viewing directions; (5) interaction of characters instruction with viewing directions. Coding for these contrasts was done to produce direct estimates of the contrast values, following the procedures outlined by Serlin and Levin (Note 1).

Testing for significant effects for each dependent variable proceeded as follows: The five treatment contrasts at Step 1 were entered into the equation and tested for significance. The overall significance level was set at $\alpha = .05$, so that each test was made at the .01 level. Contrasts 1,2, and 3 were tested one-tailed for the positive effect of treatment relative to control. Contrast 4 investigated the effect of pictorial instruction vs. control when viewing directions are present relative to that same effect when viewing directions are absent. It was hypothesized that if viewing directions, producing an relevant attentional set, were able to activate the same mental processes that instruction does, the presence of these directions would weaken the effect of instruction. Thus the instructional effect would be smaller in the viewing directions condition than in the no-viewing directions condition. With this in mind, Contrast 4 was tested one-tailed in a negative direction. Contrast 5, involving characterizations instruction rather than pictorial instruction, was tested similarly.

The three aptitude measures were entered together at the second stage. The overall significance levels for aptitudes was set at $\alpha = .05$,

so that each test was made at the .017 level, one-tailed for positive association between the aptitude and achievement.

At Step 3 the ATI were entered. Combinations of five contrasts and three aptitudes produced 15 ATI. However, while including all 15 resulted in a more sensitive test for effects of interest, not all of these 15 were considered educationally relevant. In each case, only six ATI were examined for significance: the combinations of verbal ability and of spatial ability with the attention contrast (#1) and with the instruction contrasts (#2 and #3). Given the six tests and the difficulty of establishing ATI (Cronbach & Snow, 1977), the overall α was set at a relatively liberal .15, so that each test was made at .025. Testing was done one-tailed, in the direction of a steeper slope for aptitude in the control condition than in the experimental conditions.

Results of the significance tests are shown in Tables 5 and 6. Table 5 presents, for each of the four dependent measures, the results of the overall ANOVA analysis resulting from the three hierarchical regression steps. For each step, overall sums of squares, mean squares, and F tests are included. It should be noted that in Steps 1 and 2, the F test was performed using the estimate of mean square error computed at that point in the analysis, not the one listed which is the final mean square error after all variables are in the equation. Thus these tests are not retrievable from the table as presented. The mean square error listed does correspond to the overall test for the ATI, however. Table 6 presents the results of the tests for the individual hypotheses. For each hypothesis the standardized regression coefficient, beta, is presented, along with the relevant F value. Each p value listed in the

table is the one originally set for the test, rather than the actual probability of the obtained F value.

For the total test score, significant results were found for only verbal ability and spatial ability. None of the contrasts or ATI produced significant regression coefficients. For the narrative score, significant effects were found for verbal ability and for one ATI: the interaction of verbal ability with characters instruction. Across treatments, higher verbal ability was associated with a higher score. In addition, the relationship between verbal ability and narrative score was higher in the control group than it was in the characters instruction group.

For the pictures score, a significant effect was found for Contrast 4. In addition, significant effects were found for verbal ability, spatial ability, and two ATI: spatial ability with pictures instruction and spatial ability with characters instruction. The first result indicates that pictures instruction was more strongly related to achievement on the pictures subtest when viewing directions were absent than it was when viewing directions were provided. The two aptitude main effects indicate that across the entire sample, both verbal ability and spatial ability contributed to higher scores on the pictures subtest. The ATI indicate that the relationship between spatial ability and test score was stronger in the control group than it was in either of the two instructional treatments.

For the characters subtest, none of the treatment contrasts was significant. Only verbal ability among the aptitude variables was significant. One significant ATI appeared, verbal ability with pictures instruction. In other words, although verbal ability was associated with

higher scores across the entire sample, the relationship was stronger in the control group than it was in the pictures instruction group.

The within-treatment regression equations that are indicated by the significant ATI are presented in Table 7. Across the three subtests, the four significant ATI followed a common pattern: they revealed that instruction weakened the relationship between aptitude and test score that appeared in the control group. Thus it seems that the instruction might have been successful in developing some viewing skills that had previously been differentiated by students' ability scores. The interaction between spatial ability and instruction, for pictures scores, is graphed in Figure 1. The other ATI follow a very similar pattern. They are graphed in Figures 2 and 3. In each of these graphs, the remaining aptitudes not in the ATI are held constant at their respective grand means.

Discussion

In this study, three potentially important factors were examined--instruction, attention, and aptitude. The most powerful of these variables were the viewer abilities. Verbal ability was significantly associated with higher scores for the total test and for each of the individual subtests, at p values generally far beyond the prespecified α level of .017. Spatial ability was significantly related to scores on the total test and on the pictures subtest, but not to the degree that verbal ability was. Also, spatial ability was not significantly related to scores on the narrative test or the characters test.

With this in mind, let us go back to Salomon's (1979) theory. He states that viewer skills are involved in translating an external symbolic code into an internal representation. If this is so, why wouldn't a medium that uses a pictorial code, such as television, bring spatial skills into play to a greater extent than is demonstrated here when it confronts the viewer with a pictorial configuration? And wouldn't spatial skills be more relevant to this task than verbal skills?

The answer is: not necessarily. The reason for this lies in the nature of the communicated message and the nature of the task the viewer is attempting to achieve. Salomon maintains that the pictorial content of television presentations generally does not challenge the capabilities of most viewers. The requisite spatial skills for simple processing of the narrative are almost always present in viewers, at least within a culture such as ours that is highly accustomed to television. As Salomon and Cohen (1977) reported, it was in the difficult versions of their videotaped presentation that particular aptitude skills came into play. Their straightforward version showed minimal relation to cognitive skills. Similarly, the presentation used in this study was a simple narrative. Its camerawork and editing served the purpose of furthering the narrative, and made few demands on the viewer's visual processing skills. To the extent that the videotape program used here was representative of standard television content, we might conclude that spatial ability is not highly related to the processing of most TV material, when the task involved is comprehension of the narrative.

On the other hand, performances on the pictures subtest showed that when viewers were examining the presentation for pictorial qualities such as lighting, composition, and camera point of view, spatial ability

became a significant predictor of success. In this circumstance students were attempting a generally unfamiliar form of pictorial processing. Thus it is not only the stimulus per se, but the stimulus in interaction with the viewer's perceived task that determines the skill prerequisites.

What of the highly significant contribution of verbal ability? We should not be surprised that it is present to some extent, due to the operation of at least two factors. The first is the linguistic orientation of the test--children were responding to projected multiple-choice items. However, the reliance on reading was minimized by simple wording of items and by reading the items aloud at least twice--more if requested--as they were projected from overhead transparencies. Second, verbal ability is very much a "medium-related" skill, considering the amount of dialogue in the presentation. Here too, however, an attenuating consideration applies, similar to the one above regarding spatial ability: although comprehension of dialogue was necessary, it was not of a difficult nature. The program was produced for children, and it seems unlikely that very much, if any, of the language used presented comprehension problems. Was there another reason for verbal ability's powerful effect?

It seems possible that an area in which verbal ability can come into play is the viewer's representational system. The process of comprehending the material, narrative or otherwise, involves first recoding it into internal representational forms, and then manipulating these in such a way as to construct meaning--for example, connecting present events with previous ones, understanding jumps in time and space, distinguishing characters' internal states, and so on. The high contribution of verbal ability to performance on all of the subtests

could be seen as possible evidence of verbal representation systems on the part of viewers. This suggestion is speculative, since the study was not designed expressly to address the debate over single versus multiple representation systems (e.g., Kosslyn & Pomerantz, 1977; Pylyshyn, 1981). However, the disparity between verbal and spatial abilities is a conspicuous result.

The poor performance of reported home viewing as a predictive variable is not an unexpected outcome. As Salomon (1979) asserts, by virtue of its pictorial symbol system, television allows shallow processing on the part of the viewer. If this is true of leisure viewing done at home, there is no reaso to expect it to be related to performance on a television task that requries the use of particular skills. Thus we found that a child's reported hours logged at the set at home did not show evidence of preparing him or her to deal with the demands of the tasks presented in this study. However, we must repeat the caution that we are dealing with reported hours and not a measure of actual hours. For instance, Salomon (1979) reports a correlation of only about .50 between a general self-report measure and a more specific measure of home viewing.

What of the results of attention? The viewing directions at the time of testing, included to direct children's attentional processes, did not produce any significant changes in children's comprehension of the program. Viewing directions were involved in only one significant hypothesis test--their interaction with pictorial instruction on the pictures subtest. This generally negative result is surprising--if television does allow a high variability in depth of processing,

increased attention would be one of the primary mechanisms through which learning could be enhanced.

One interpretation of the result would be that attention plays a limited role in the process. However, considering the several forms of information studied (narrtive, pictorial, and characterizations) and the wealth of research regarding the overall relationship between attention and learnirg (e.g., Reder, 1980), this conclusion must be regarded as unlikely. A more probable explanation would be that the procedures followed did not produce an adequate shift in the attention pattern children used. Indeed, it is not known how difficult it is to alter children's attention patterns while watching TV. Little has been done on instructional attempts to modify attention to specific forms of content, or the consequences of those attempts.

In our case recall that the experimenter first led a 10- to 15-minute discussion of what to look for in the program, then showed the half-hour tape. At the time of testing he again went through the discussion, following this with the clips and the test items. It may be that when the videotape was first played, even if children assumed the desired attentional set, they dropped it in the course of watching the program and relaxed into familiar viewing patterns. The discussion, although perhaps stimulating at the time it took place, might not have produced long-lasting effects. If this is the case it might be desirable to insert directions into the program itself. The use of priming questions, addressing the content directly instead of general attentional directions, might also produce stronger patterns of information acqusition.

Another possible reason for the lack of results in the attention directions treatment may lie at the point of responding. Children could not see the questions before they saw the clips but it may be that after a few questions, children in the no-directions condition were able to assume the proper attentional set through noticing the content of the early questions and adjusting their attention accordingly. To determine if this is the case, a replication could be done in whcih the question contents varied sufficiently to reduce predictability of subsequent questions.

The third kind of factor investigated was instruction. The two kinds of instruction studied--pictorial elements and characterizations--did not exhibit significant main effects relative to control. However, they resulted in several interesting interactions with ability. The pictures subtest was involved in tw of these: spatial ability interacted with both pictorial instruction and characterizations instruction. The natures of the two ATI were similar--a relation existed between test score and aptitude in the control condition, while this relationship was substantially weakened in the instruction condition. The narrative score showed an analogous interaction between verbal ability and characterizations instruction. The characters score showed this same pattern of interaction between pictorial instruction and verbal ability. Again, the effects of ability were stronger when children did not undergo instruction than when they did.

The instructional treatments showed a certain amount of generalizability--for instance, pictorial instruction appeared in an ATI for the characters subtest. Perhaps the attention to certain kinds of detail that is encouraged by certain kinds of instruction may be applied

to other kinds of detail as well. However, the similarity of these relationships, taken as a group, is striking. The results suggest that those differences in children's television learning that are attributable to ability differences are also susceptible to instructional interventions. Thus it might be useful for educators to teach children about television's codes and formats if those children are to maximize their learning capabilities from the medium. While being differentially effective for learners of varying aptitude levels, instruction can increase overall learning by bringing lower ability students close to the performance levels of their higher-ability peers. At present some children may be unable, rather than unwilling, to progrss beyond the simple processing levels with which they now approach the medium.

I will conclude by reviewing some of the major findings from the study. First, viewer ability, particularly verbal ability, proved to be the most salient predictor of learning from the television task across the several task areas. Second, reported home viewing by children did not significantly affect the amount learned. Third, neither attention nor instruction produced main effects for learning, but instruction did interact with ability across several task areas. These ATI indicated that instruction in the make-up of television presentations can improve the learning of low-ability students relative to high ability students. In general, the study shows that analysis of television as a communicational medium can be helpful in describing the psychological aspects of the viewing process. One of the challenges for educational researchers working in this area is to enrich the television-viewing experience for children by encouraging deeper, more involved processing

and elaboration of recoded material--in short, getting children to think more while they're watching, whether in critical, integrative, or creative modes.

Reference Note

1. Serlin, R.C., & Levin, J.R. Coding for direct interpretation in multiple regression analysis (Occasional Paper No. 22). Madison, Wisconsin: University of Wisconsin, Department of Educational Psychology, 1979.

References

Collins, W.A. The developing child as viewer. Journal of Communication, 1975, 25, 35-44.

Collins, W.A., Wellman, H., Keniston, A.H., & Westby, S.D. Age-related aspects of comprehension and inference from a televised dramatic narrative. Child Development, 1978, 49, 389-399.

Comstock, G., Chaffee, S., Katzman, N., McCombs, M., & Roberts, D. Television and human behavior. New York: Columbia University Press, 1978.

Cronbach, L.J., & Snow, R.E. Aptitudes and instructional methods. New York: Irvington, 1977.

Ekstrom, R.B., French, J.W., & Harman, H.H. Manual for the Kit of Factor-Referenced Cognitive Tests. Princeton, N.J.: Educational Testing Service, 1976.

Kosslyn, S.M., & Pomerantz, J.R. Imagery, propositions, and the form of internal representations. Cognitivie Psychology, 1977, 9, 52-76.

Pylyshyn, Z.W. The imagery debate: Analogue media vs. tacit knowledge. Psychological Review, 1981, 88, 16-45.

Salomon, G. Interaction of media, cognition, and learning. San Francisco: Jossey-Bass, 1979.

Salomon, G., & Cohen, A.A. Television formats, mastery of mental skills, and the acquisition of knowledge. Journal of Educational Psychology, 1977, 69, 612-619.

Thorndike, R.L., & Hagen, E. Examiner's manual, Cognitive Abilities Test. Boston: Houghton-Mifflin, 1971.

Table 1

Means and Standard Deviations of Aptitudes and Outcomes

Variable	Instructional Group		
	Pictorial N=51	Characterizations N=50	Control N=53
Vocabulary			
M	18.44	19.16	18.34
SD	4.13	3.82	4.37
Sentence Completion			
M	21.50	21.84	20.36
SD	3.23	3.09	3.70
Figure Synthesis			
M	28.27	28.02	28.06
SD	4.71	3.68	4.14
Card Rotations			
M	67.71	61.24	67.30
SD	25.56	26.39	30.61
Building Memory			
M	11.67	11.22	10.49
SD	5.52	5.87	5.72
Maze Tracing			
M	23.46	23.70	23.51
SD	5.60	5.64	6.76
Home Viewing			
M	14.75	14.66	14.97
SD	5.89	7.10	6.69
Total Score			
M	24.02	23.41	23.60
SD	4.37	3.85	4.70
Narrative Score			
M	8.94	8.88	8.76
SD	1.99	1.85	1.95
Pictorial Score			
M	6.81	6.55	6.23
SD	1.77	1.60	1.75
Characterizations Score			
M	8.27	7.98	8.62
SD	1.89	1.82	2.21

Note: Maximum possible scores:

Vocabulary: 35	Bldg. Mem.: 24	Total Score: 35
Sent. Comp.: 35	Maze Trac.: 48	Narr. Score: 12
Fig. Syn.: 40	Viewing: 20	Pict. Score: 11
Rotations: 160		Char. Score: 12

Table 2

Correlations Among Aptitude and Outcome Variables

Variable	Variable									
	SC	FIG	ROT	MEM	MAZ	VIE	TOT	NAR	PIC	CHA*
Vocabulary	.73	.46	.32	.43	.16	-.30	.54	.43	.44	.36
Sentence Completion		.54	.41	.46	.19	-.36	.54	.39	.51	.35
Figure Synthesis			.48	.45	.32	-.30	.40	.36	.33	.24
Card Rotations				.38	.35	-.23	.35	.16	.35	.30
Building Memory					.27	-.16	.45	.33	.45	.27
Maze Tracing						-.13	.27	.23	.25	.15
Rep. Home Viewing							-.17	-.08	-.12	-.18
Total Score								.79	.72	.78
Narrative Score									.38	.42
Pictures Score										.32

*CHA = Characters Score

Table 3

Factor Loadings for Aptitude Variables

Test	Factor 1	Factor 2
Vocabulary	.85	-.04
Sentence Completion	.85	.06
Figure Synthesis	.31	.52
Card Rotations	.09	.63
Building Memory	.31	.39
Maze Tracing	-.10	.57

Correlation of Factor 1 with Factor 2: .53

Table 4

Treatment Contrasts Examined in Step One

of Regression Analysis

Directions Treatment	Instructional Treatment		
	B_1 Pictorial	B_2 Characterizations	B_3 Control
A_1 Viewing Directions	A1B1	A1B2	A1B3
B_1 No Viewing Directions	A2B1	A2B2	A2B3

Contrast

1: $X_{A1} - X_{A2}$

2: $X_{B1} - X_{B3}$

3: $X_{B2} - X_{B3}$

4: $(X_{A_1B_1} - X_{A_1B_3}) - (X_{A_2B_1} - X_{A_2B_3})$

5: $(X_{A_1B_2} - X_{A_1B_3}) - (X_{A_2B_2} - X_{A_2B_3})$

Table 5

Summary of Regression Analyses

Variables in regression	df	Overall SS	MS	F*
Total score				
Treatments	5	143.89	28.78	1.60
Aptitudes	3	1003.58	334.53	29.32
ATI	15	121.14	8.08	.68
Error	130	1534.02	11.80	
Total	153	2802.63		
Narrative score				
Treatments	5	25.72	5.14	1.46
Aptitudes	3	107.16	35.72	12.53
ATI	15	35.92	2.39	.83
Error	130	376.74	2.90	
Total	153	545.54		
Pictures score				
Treatments	5	28.07	5.61	1.94
Aptitudes	3	137.40	45.80	22.79
ATI	15	37.85	2.52	1.29
Error	130	253.01	1.95	
Total	153	456.33		
Characters score				
Treatments	5	22.56	4.51	1.15
Aptitudes	3	97.69	32.56	9.72
ATI	15	49.13	3.28	.98
Error	130	436.03	3.35	
Total	153	605.41		

* Only the F test for ATI uses the error term shown. See text for explanation.

Table 6

Tests of Regression Coefficients

for the Dependent Variables

	Total score			Narrative score		
Hypothesis	Beta	F	p*	Beta	F	p*
Contrast 1	-.10	1.57	NS	-.15	3.41	NS
Contrast 2	-.05	.35	NS	.06	.38	NS
Contrast 3	.01	.01	NS	.06	.37	NS
Contrast 4	-.16	2.92	NS	-.08	.81	NS
Contrast 5	-.21	5.20	NS	-.16	3.16	NS
Verbal ability	.48	27.70	.017	.39	14.33	.017
Spatial ability	.20	5.06	.017	.12	1.46	NS
Home viewing	.06	.88	NS	.10	1.72	NS
Verbal X 1	-.05	.22	NS	-.11	.99	NS
Verbal X 2	-.03	.08	NS	.03	.08	NS
Verbal X 3	-.17	2.36	NS	-.28	5.32	.025
Spatial X 1	.03	.12	NS	.05	.27	NS
Spatial X 2	-.07	.54	NS	-.03	.06	NS
Spatial X 3	.03	.11	NS	.14	1.47	NS

* Listed p values reflect planned α levels. All tests are one-tailed. See text for details.

Table 6 (cont.)

Tests of Regression Coefficients

for the Dependent Variables

	Pictures score			Characters score		
Hypothesis	Beta	F	p*	Beta	F	p*
Contrast 1	.02	.04	NS	-.09	1.20	NS
Contrast 2	.16	3.20	NS	-.08	.71	NS
Contrast 3	.09	.99	NS	-.14	2.37	NS
Contrast 4	-.21	5.50	.01	-.07	.63	NS
Contrast 5	-.18	4.02	NS	-.14	2.16	NS
Verbal ability	.40	18.01	.017	.31	8.66	.017
Spatial ability	.23	6.47	.017	.11	1.15	NS
Home viewing	.09	1.45	NS	-.03	.17	NS
Verbal X 1	.04	.17	NS	-.03	.07	NS
Verbal X 2	.18	2.81	NS	-.25	4.31	.025
Verbal X 3	.07	.47	NS	-.16	1.59	NS
Spatial X 1	.11	1.39	NS	-.08	.54	NS
Spatial X 2	-.22	4.88	.025	.06	.27	NS
Spatial X 3	-.21	4.00	.025	.12	1.04	NS

* Listed p values reflect planned α levels. All tests are one-tailed. See text for details.

Table 7

Within-group Regression Equations for Scores Exhibiting ATI

Dependent variable and instructional group	Constant	b_{verbal}	$b_{spatial}$	$b_{viewing}$
Narrative score				
Characters instruction	9.01	- .01	.88	.00
Control group	8.95	1.09	.18	.01
Pictures score				
Pictorial instruction	6.79	1.26	.05	.01
Characters instruction	6.44	.80	.27	.00
Control group	6.33	.45	1.05	.01
Characters score				
Pictures instruction	8.27	.28	.19	.00
Control group	8.84	1.25	- .06	.00

Note: Home viewing expressed as a deviation score.

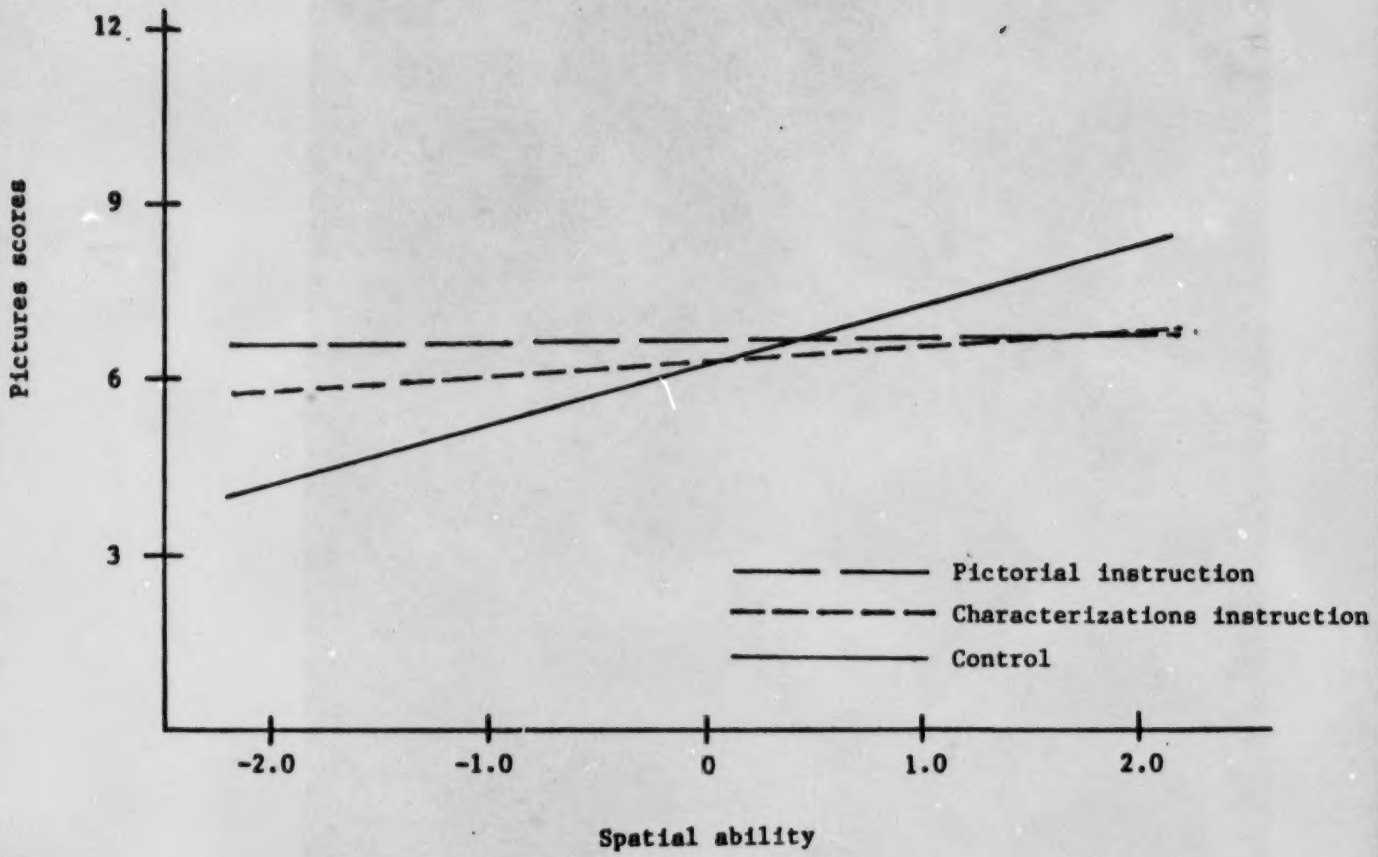

FIGURE 1. Pictures scores regressed on spatial ability for each instructional group.

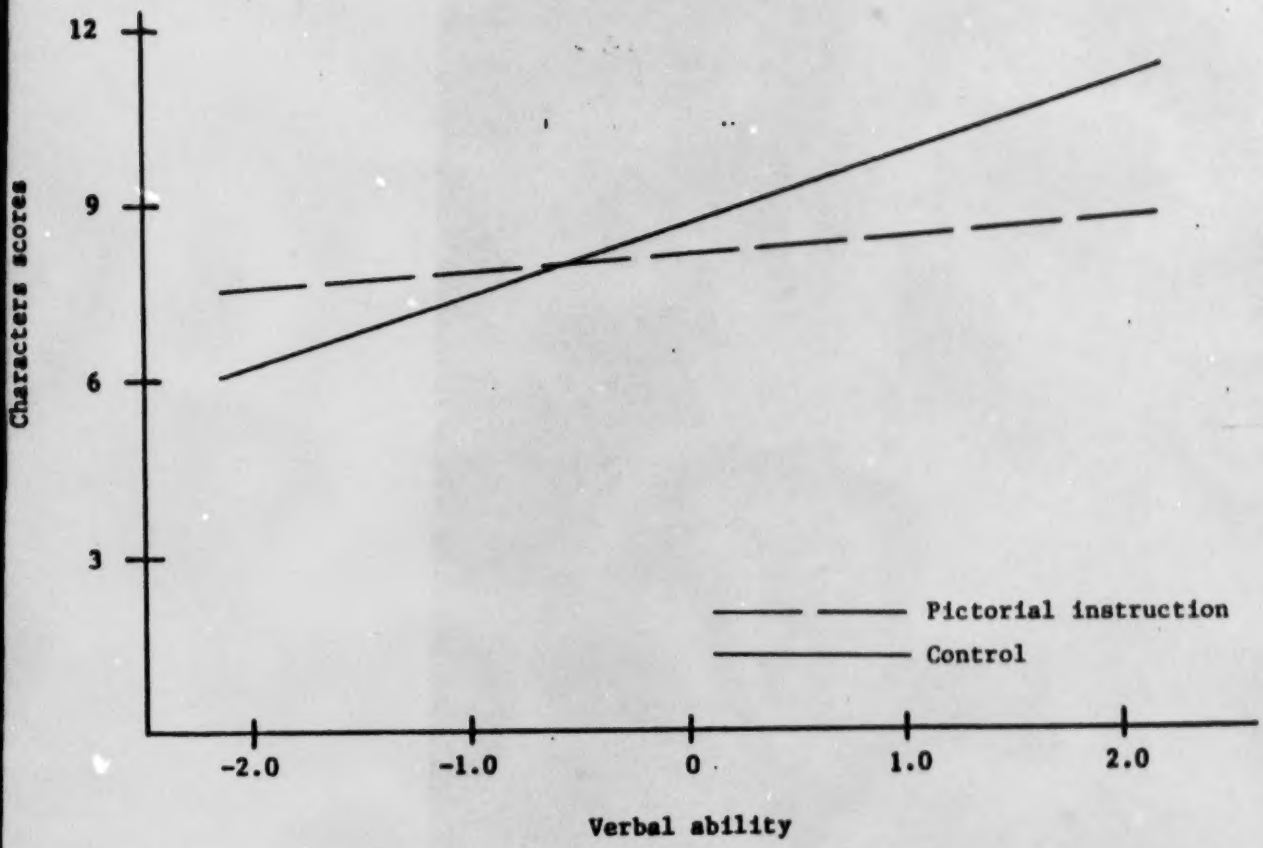

FIGURE 2. Characters scores regressed on verbal ability for the pictorial and control instructional groups.

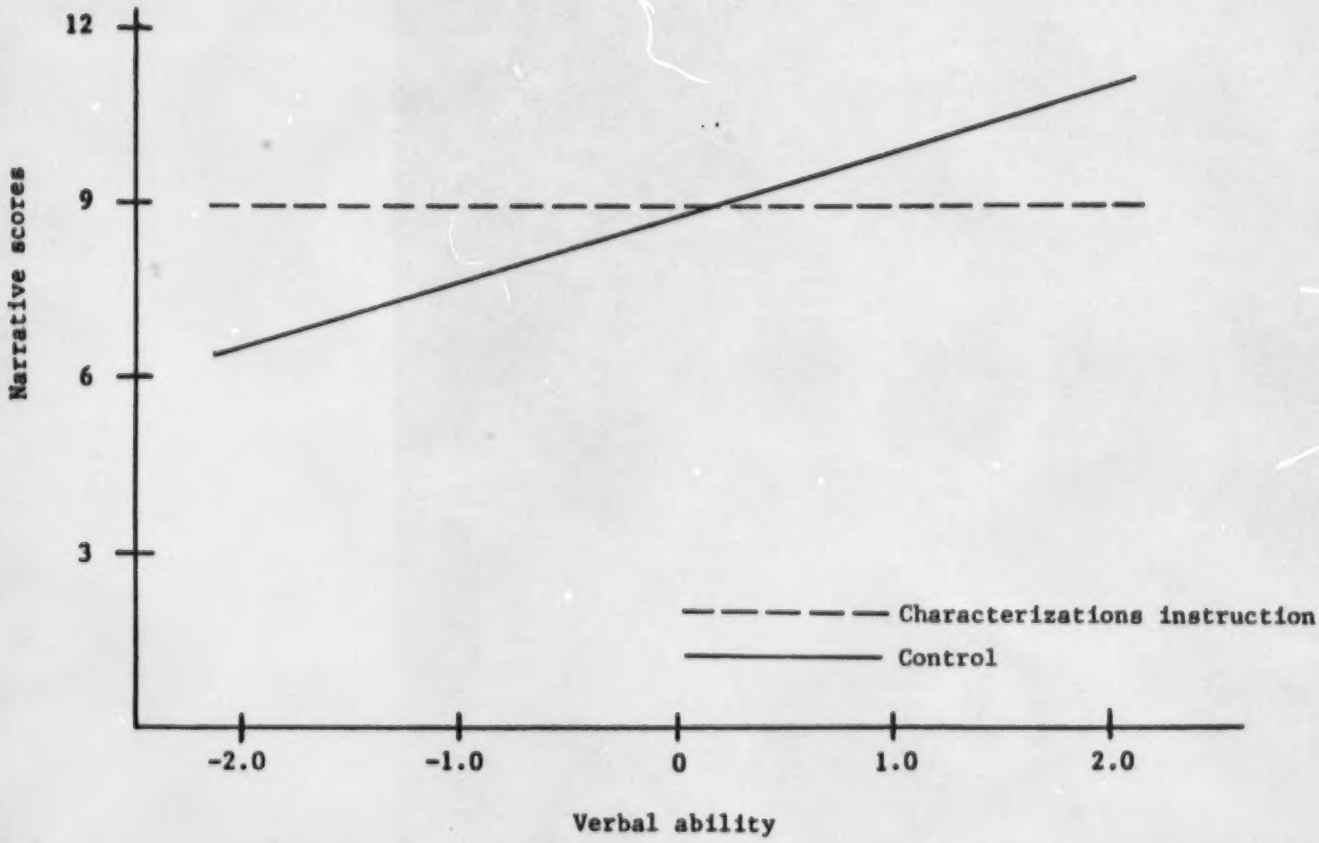

FIGURE 3. Narrative scores regressed on verbal ability for the characterizations and control instructional groups.